

UNCLASSIFIED DTIC FILE COPY

(2)

SECURITY CLASSIFICATION OF THIS PAGE

## REPORT DOCUMENTATION PAGE

Form Approved  
OMB No. 0704-01881a. REPORT SECURITY CLASSIFICATION  
Unclassified

1b. RESTRICTIVE MARKINGS

2a. SECURITY CLASSIFICATION AUTHORITY

LE

3. DISTRIBUTION / AVAILABILITY OF REPORT

Unlimited

AD-A196 593

R(S)

5. MONITORING ORGANIZATION REPORT NUMBER(S)

AFOSR-TR- 88-0542  
AFOSR-86-0247

6a. NAME OF PERFORMING ORGANIZATION

Electronics Research Lab.

6b. OFFICE SYMBOL  
(If applicable)

7a. NAME OF MONITORING ORGANIZATION

Air Force Office of Scientific Research

6c. ADDRESS (City, State, and ZIP Code)

University of California  
Berkeley, CA 94720

7b. ADDRESS (City, State, and ZIP Code)

Bldg. 410, Bolling Air Force Base  
Washington, DC 203328a. NAME OF FUNDING / SPONSORING  
ORGANIZATION

AFOSR

8b. OFFICE SYMBOL  
(If applicable)

NM

9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER

AFOSR-86-0247

8c. ADDRESS (City, State, and ZIP Code)

Bldg 410, Bolling Air Force Base  
Washington, DC 20332

10. SOURCE OF FUNDING NUMBERS

PROGRAM  
ELEMENT NO.

61102F

PROJECT  
NO.

2917

TASK  
NO.

A5

WORK UNIT  
ACCESSION NO.

11. TITLE (Include Security Classification)

Optimization-Based Design of Control Systems

12. PERSONAL AUTHOR(S)

E. Polak

13a. TYPE OF REPORT

Final Report

13b. TIME COVERED

FROM 7/31/86 TO 7/30/87

14. DATE OF REPORT (Year, Month, Day)

4/13/88

15. PAGE COUNT

2

16. SUPPLEMENTARY NOTATION

17. COSATI CODES

FIELD

GROUP

SUB-GROUP

18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)

19. ABSTRACT (Continue on reverse if necessary and identify by block number)

(i) A DEC MicroVax II GPX Color workstation has been acquired for experimentation with the DELIGHT.MIMO interactive software system in the solution of optimal, worst case design of multivariable control systems. (ii) A SUN workstation - based system has been expanded for experiments in distributed computing for the optimal, integrated design of flexible structures and their control systems.

DTIC  
SELECTED  
MAY 20 1988  
S & D

20. DISTRIBUTION / AVAILABILITY OF ABSTRACT

☒ UNCLASSIFIED/UNLIMITED ☐ SAME AS RPT. ☐ DTIC USERS

21. ABSTRACT SECURITY CLASSIFICATION

22a. NAME OF RESPONSIBLE INDIVIDUAL

JAMES M CROWLEY, Maj, USAF

22b. TELEPHONE (Include Area Code)

(202) 767-5025

22c. OFFICE SYMBOL

AFOSR/NM

UNCLASSIFIED

AFOSR-TR- 88-0542

## OPTIMIZATION-BASED DESIGN OF CONTROL SYSTEMS

Final Technical Report  
AFOSR Grant 86-0247  
(July 31, 1986 — July 30, 1987)

Elijah Polak  
Principal Investigators



Accession For	
NTIS CRA&I	<input checked="" type="checkbox"/>
DTIC TAB	<input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification	
By	
Distribution	
Availability	
Date	Availability
A-1	

Department of Electrical Engineering and Computer Sciences  
and the Electronics Research Laboratory  
University of California  
Berkeley, CA 94720

FINAL REPORT FOR AFOSR EQUIPMENT GRANT No. 86-0247 (22521)

**ABSTRACT** (i) A DEC MicroVax II GPX Color workstation has been acquired for experimentation with the DELIGHT.MIMO interactive software system in the solution of optimal, worst case design of multivariable control systems. (ii) A SUN workstation - based system has been expanded for experiments in distributed computing for the optimal, integrated design of flexible structures and their control systems.

**INTRODUCTION** As part of our research on optimization-based design of multivariable control systems (sponsored by ONR) and on the optimization-based, integrated design of large space structures and their control systems (sponsored by AFOSR), we are carrying out research on the development of interactive software systems for the implementation of the design techniques we are producing. In particular, (i) we are developing DELIGHT.MIMO, an interactive computing system for the optimal, worst case design of multivariable control systems, and (ii) we are beginning to architect a distributed computing system, consisting of a work station for user-machine interaction and a large frame computer for system response simulation, for the design of flexible structures and their control systems.

**SUMMARY OF EQUIPMENT USE**

(i) The DEC MicroVax II GPX Color workstation is being used to implement DELIGHT.MIMO in an X-Windows environment.

(ii) The power and versatility of our fileserver-based SUN workstation system has been upgraded from SUN2 to SUN3 format and expanded by the addition of the following items:

1. One SUN 2 Upgrade, incl. 2/160-2 workstation & Floating Point Unit,
2. One SUN 3/140, 4MB workstation,
3. One SUN X511A "Shoebox" Disk/Tape Unit,
4. One Sun X960A Rack,
5. One Fujitsu Eagle Disk Drive,
6. One Apple Laserwriter Printer.

As a result of these additions, all the students and faculty participating in the project now have individual access to a workstations, which has considerably increased the productivity of our experimental work. Our skill in using workstations productively is also being considerable expanded, to the extent that plans for distributed computing, optimal design system experiments, involving flexible structures

and their control systems, are now beginning to be implemented, in collaboration with researchers at NASA Langley Research Center. Furthermore, the additions are enabling us to implement DELIGHT.MIMO in several graphical environments, which increases its portability and ease of transferring it to industry.